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EXAMINER

GOUDREAU, G

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 1104 | 6 |

DATE MAILED: 05/06/92

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

This application has been examined Responsive to communication filed on _____ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), 0 days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- Notice of References Cited by Examiner, PTO-892.
- Notice re Patent Drawing, PTO-948.
- Notice of Art Cited by Applicant, PTO-1449.
- Notice of Informal Patent Application, Form PTO-152.
- Information on How to Effect Drawing Changes, PTO-1474.
- _____

Part II SUMMARY OF ACTION

1. Claims 1-10 are pending in the application.

Of the above, claims _____ are withdrawn from consideration.

2. Claims _____ have been cancelled.

3. Claims _____ are allowed.

4. Claims 1-10 are rejected.

5. Claims _____ are objected to.

6. Claims _____ are subject to restriction or election requirement.

7. This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. Formal drawings are required in response to this Office action.

9. The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are acceptable. not acceptable (see explanation or Notice re Patent Drawing, PTO-948).

10. The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been approved by the examiner. disapproved by the examiner (see explanation).

11. The proposed drawing correction, filed on _____, has been approved. disapproved (see explanation).

12. Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has been received not been received
 been filed in parent application, serial no. _____; filed on _____

13. Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. Other

EXAMINER'S ACTION

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15.) Claim 3 is rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "said film has an uneven surface" in line 3 of claim 3 on page 2 of amendment A is vague and indefinite. (What exactly constitutes an uneven surface? Isn't every surface uneven to some extent?)

16.) The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

17.) Claims 1-4 are rejected under 35 U.S.C. § 103 as being

unpatentable over Horioka et. al.

Horioka et. al. disclose the photo-CVD deposition of a SiO₂ layer on a semiconductor substrate using a laser to activate a TEOS reactive gas. This is discussed in the abstract.

Horioka et. al. fail, however, to disclose the following aspects of applicant's claimed invention:

- the specific use of either a Hg-lamp or plasma generation means as an excitation source for the promotion of the CVD deposition of a SiO₂ layer from a TEOS precursor gas; and
- the CVD deposition of a SiO₂ layer specifically on an uneven surface.

It would have been obvious to one skilled in the art to promote the CVD deposition of a SiO₂ layer in the method disclosed by Horioka using other excitation means besides the laser disclosed by Horioka et. al. such as a plasma generation means or UV light from a Hg lamp based on the following. First, it is well known in the CVD art that CVD reactions may be promoted by a variety of alternative and at least equivalent means such as thermal, photo (i.e.- laser, Hg-lamp, etc.) and plasma excitation. This simply represents the replacement of the laser taught by Horioka et. al. with an alternative or at least equivalent means for promoting the CVD deposition of a SiO₂ layer from a TEOS precursor gas such as a plasma generation means or UV light from a Hg-lamp. Further, there are lasers (i.e.- Xe-Cl)

lasers) which operate with wavelengths approximately the same as Hg lamp (ie. - 308 nm for the Xe-Cl laser of Horioka et. al. vs. 254 nm for the Hg-lamp such that there would be no reason for one skilled in the art to believe that a SiO₂ layer formed from a TEOS precursor gas excited with a Xe-Cl laser would be any different from one formed from a TEOS precursor gas excited with a Hg-lamp. That is to say one would expect both reactions to proceed by the same photo-mechanism absent any showing of unexpected results.

It would have been inherent or at least obvious that the SiO₂ layer deposited in the method disclosed above would occur on an uneven surface since every substrate's surface is uneven to some extent.

18.) Claims 5-6 are rejected under 35 U.S.C. § 103 as being unpatentable over the reference as applied in paragraph 17 above further in view of Shigetomi and either (Benzing or Hayes et. al. or Tashiro et. al. or Van Mastrigt) as applied in paragraph 18 of the previous office action.

19.) Claims 7-10 are rejected under 35 U.S.C. § 103 as being unpatentable over Ghandi further in view of Hakue et. al. and

Shigetomi.

Ghandi discloses that it is desirable to be able to plasma CVD deposit a SiO₂ layer onto a semiconductor substrate using a plasma comprised of silane (SiH₄) and O₂. This is discussed on pages 422-423.

Ghandi fails, however, to disclose the following aspects of applicant's claimed invention:

-the specific use of a two step process for depositing a SiO₂ layer onto a device comprised of a first step of photo-CVD depositing a first SiO₂ layer from a gas containing no carbon and a second step of plasma-CVD depositing a second SiO₂ layer onto the first layer.

Hakutani et al. teach that it is desirable to first photo-CVD deposit a layer of material onto a device before plasma-CVD depositing a second layer of material onto the device. Hakutani et al. specifically mention the deposition of SiO₂ onto the device in order to reduce the amount of radiation damage done to the substrate. This is shown in figure 5, and discussed in columns 1-5.

Shigetomi teach that the light window through which radiation passes in a photo-CVD apparatus gradually becomes covered up with material which blocks the transmittance of radiation through the light window requiring that the light window be plasma cleaned between CVD runs so that the photo-CVD

deposition rate is not substantially impaired.

It would have been obvious to one skilled in the art to conduct the one-step CVD deposition of SiO₂ with a gas comprised of silane and O₂ as taught by Ghandi in a two step process comprised of first photo-CVD depositing the SiO₂ layer onto the device and then plasma-CVD depositing the SiO₂ layer based on the following. First, Haku et. al. teach that it is desirable to first photo-CVD deposit a layer of material onto a device and then plasma-CVD deposit a layer of material onto a device in order to reduce the amount of radiation damage done to the device over that which would occur if material were directly plasma-CVD deposited onto the device. Second, Shigetomi teaches that there is a basic problem with photo-CVD processes which relates to a significant reduction in the amount of radiation passing through the light window of a photo-CVD apparatus with time due to the unwanted deposition of material onto the light window. It is further taught that these deposits must be removed from the light window between successive CVD runs. Thus, it would have been obvious to one skilled in the art to coat Ghandi's device with SiO₂ in a two step CVD deposition process which produces less radiation damage to the device than the strictly plasma-CVD process taught by Ghandi but is not subject to the significant retardation of the SiO₂ deposition rate which is characteristic of a strictly photo-CVD process. (In this way, the amount of

radiation damage done to the device would be reduced since no material is directly plasma-CVD deposited onto the device. Also, the problem with the rate of photo-CVD deposition of the SiO₂ significantly falling off as the CVD reaction proceeds due to the undesired coating of the light window with SiO₂ would be reduced since the process could be switched from a photo-CVD to a plasma-CVD process before the deposition rate of SiO₂ significantly falls off.)

20.) Applicant's arguments with respect to claims 1-6 have been considered but are deemed to be moot in view of the new grounds of rejection.

21.) Applicant's amendment necessitated the new grounds of rejection. Accordingly, THIS ACTION IS MADE FINAL. See M.P.E.P. § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE

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MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

22.) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner George A. Goudreau whose telephone number is (703)-308-1915.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703)-308-0651 .

George A. Goudreau

George A. Goudreau

Examiner (Art Unit 134)

BRIAN E. HEARN
BRIAN E. HEARN
SUPERVISORY PRIMARY EXAMINER
ART UNIT 114